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legless and serpentiform in shape. In the absence of the skull, he referred the form, as Cope had done, to the Reptilia. Two years later F. Broili thought that he recognized in some imperfect skull material of the same species a pair of flat bones below the palatal region, which he believed to be gular plates. As such plates are characteristic of fishes and unknown in reptiles, with which he also classed the genus, he reached the rather startling conclusion that the reptiles were, in part at least, derived directly from the fishes—a conclusion, it is needless to say, which was received with doubt and incredulity by naturalists. Because of this extraordinary character he proposed for the form the family name *Paterosauridæ*.

Recently, in the examination of the Texas Permian material in the Chicago University collection, I was so fortunate to find a skull of *Lysorophus* in connection with vertebræ, which, upon preparation proves to be wonderfully perfect and complete. The so-called "gular plates" of Broili are merely and clearly four pairs of epibranchials, all nearly of the same size, the first pair only with a stout pair of ceratobranchials connected with them. Upon the whole the branchial apparatus resembles not a little that of *Necturus* or *Proteus*; and indeed there are certain other resemblances to these salamanders in the skull that can not be overlooked—the small, pointed snout, the very small size and anterior position of the orbits and nares, especially. The temporal region is unossified; the basioccipital is ossified and there are two occipital condyles. There is no pineal eye; and there is a pair of large plates, apparently proatlantal, back of the small, unpaired supraoccipital.

*Lysorophus* was a slender, well-ribbed, serpentiform, legless, probably blind, mud-burrowing amphibian, with long, one-headed ribs attached neurocentrally, and with notochordal vertebræ, strangely resembling, though genetically very distinct from, the modern *Cæcilia*. In skull structure it is not unlike modern amphibians, but will doubtless require the erection of a new group for its reception, a

group equivalent to the modern *Cæcilia*. In length the creature may have reached a foot or fifteen inches, though the skull measures but a trifle more than half an inch.

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#### COMBINATIONS OF ALTERNATIVE AND BLENDING INHERITANCE

WHETHER blending and alternative inheritance are fundamentally the same thing or not, they are usually sharply to be distinguished in their end results. Mendelian work has been almost wholly concerned with alternative inheritance. However, usually each member of the Mendelian pair exhibits fluctuating variation. Tallness of peas is dominant in a Mendelian sense over dwarfness, but each sort varies as to height. When either condition is pure (homozygous) only blending inheritance is concerned. When the two conditions are crossed we have to consider a combination of both alternative and blending inheritance.

When the ranges of variation of the two conditions do not overlap no confusion would occur. However, when they do, although Mendelian segregation and purity of germ may be as perfect as ever, confusion would arise. In the beetle *Crioceris asparagi* there are three pigmentless areas on each elytron. These areas may be distinct or they may be united in various degrees. Usually it is the anterior and middle area which unite. They may be well united, or only faintly so, or not united at all but extra large, or they may not be united and small. It seems<sup>1</sup> that the condition of areas-distinct-and-small is a Mendelian dominant over areas-united. However, the recessive character is subject to the fluctuation just mentioned and the inheritance of these fluctuations is a problem of blending inheritance as contrasted with the problem of areas-distinct *vs.* areas-united.

I have been carrying on a study of the inheritance of abnormal venation in *Drosophila ampelophila* for about forty generations of the fly. As was pointed out in a preliminary report of the work before the Boston meeting

<sup>1</sup>Lutz, *Psyche*, June, 1908.

of the International Zoological Congress, we have here the difficulty in applying Mendelism that the range of variation of the recessive character (extra veins) includes, in its somatic manifestation, the dominant characteristic, so that when the recessive character is not well developed we get, even in strains supposedly "pure" with respect to the recessive character, flies that somatically lack the extra veins. However, the degree of development of these extra veins is inherited and the study of such inheritance is a typical one of blending inheritance. Since the degree of development of the abnormality is inherited there must be a correlation between the potency of the "determiners" in the germs and the soma from which these germs came, also between them and the soma they produce. Flies having slight abnormalities produce germs tending to have the abnormality-producing factor weak. When such flies are mated with flies which lack the factor the zygote is so weak with respect to the factor that few, if any, of the offspring are abnormal. However, if flies, producing germs strong with respect to the factor, are mated with flies lacking it, abnormalities will be produced. In other words, we have imperfect dominance. This theory of imperfect dominance possesses the advantage, from the Mendelian's view-point, that one does not have to give up a fundamental principle of Mendelism—segregation or purity of the germ. An explanation of certain cases of latency, such as the carrying of pigment possibilities in white animals where albinism is recessive, is also suggested. For example, the spotted condition of guinea-pigs varies in a negative direction until pigment is to be found only in the eyes or in a very small part of the skin,<sup>2</sup> hence presumably beyond this point, when, although it is germinally present it is not somatically evident.

In other words, when the ranges of variation of Mendelian pairs overlap, the Mendelian phenomena will be masked, owing to the inability of the experimenter to properly classify his material. Nevertheless, the fundamental principle of Mendelism—segre-

gation—may still be operative. For example, Castle<sup>3</sup> concluded that the inheritance of polydactylism was *neither* alternative nor blending. May it not be *both* alternative and blending? The distinction seems theoretically important.

FRANK E. LUTZ

#### DISTRIBUTION OF DIABASE IN MASSACHUSETTS

No diabase is found west of the Triassic. In the Triassic and east to a line N. 10° E. through the Brookfields is a "Hunne diabase" with two pyroxenes—an augite and a white diopside and feldspars in two generations.

Next east a series of large dykes runs N. 20° E. through Spencer nearly across the state, of a micrographic Hunne diabase, *i. e.*, a rock closely like the above, but containing often abundantly quartz and orthoclase intergrown.

The two types repeat the relations of the western bedded diabase and the Palisade diabase in New Jersey, as recently brought out by Mr. T. Volney Lewis, at the winter meeting of the New York Academy of Sciences. Next east in Massachusetts a band of olivine diabase runs north from Blackstone half across the state.

All the remaining eastern part of the state east of a line drawn about N. 10° W. from the northeast corner of Rhode Island is occupied by a normal diabase, with augite and feldspar in one generation, no olivine or micrographic structure, rich in iron, often showing long rows of octahedra; much weathered and running to coarser grain, and in part of pretriassic age.

Again, in addition to the nepheline rocks around Salem, an interrupted band runs N. 10° W. from Woonsocket, near the northeast corner of Rhode Island, across Massachusetts and into New Hampshire, and the olivine diabase mentioned seems to be in relation with the same. These rough notes are presented as a preface to a request that any one having slides of diabase from Massachusetts would kindly send to the writer information as to whether the same contains olivine, diopside,<sup>4</sup> micrographic or porphyritic structure.

<sup>2</sup> Castle, 1905, Carnegie Pub., No. 23.

<sup>3</sup> 1906, Carnegie Pub., No. 49.